Manitoba

ANNUAL REPORT

1983-84

Mineral Resources Division
Manitoba Energy
and Mines

85-4389/

The Honourable Pearl McGonigal

Lieutenant Governor of the Province of Manitoba

May it please your Honour.

I have the honour of presenting to you the Annual Report of the Mineral Resources Division of the Department of Energy and Mines for the fiscal year ending March 31, 1984.

This report records the activities of the Mineral Resources Division and the performance of the mineral resources industry of the province during the year.

Wilson Parasiuk.

Wilson Parasiuk,

Minister.

The Honourable Wilson Parasiuk

Minister of Energy and Mines

Dear Sir:

I have the honour to present the Annual Report of the Mineral Resources Division of the Department of Energy and Mines for the fiscal year ending March 31, 1984. The report contains a descriptive and statistical record of activities and achievements in the mineral resource sector during the year.

Marc Eliesen

Marc Eliesen,

Deputy Minister.

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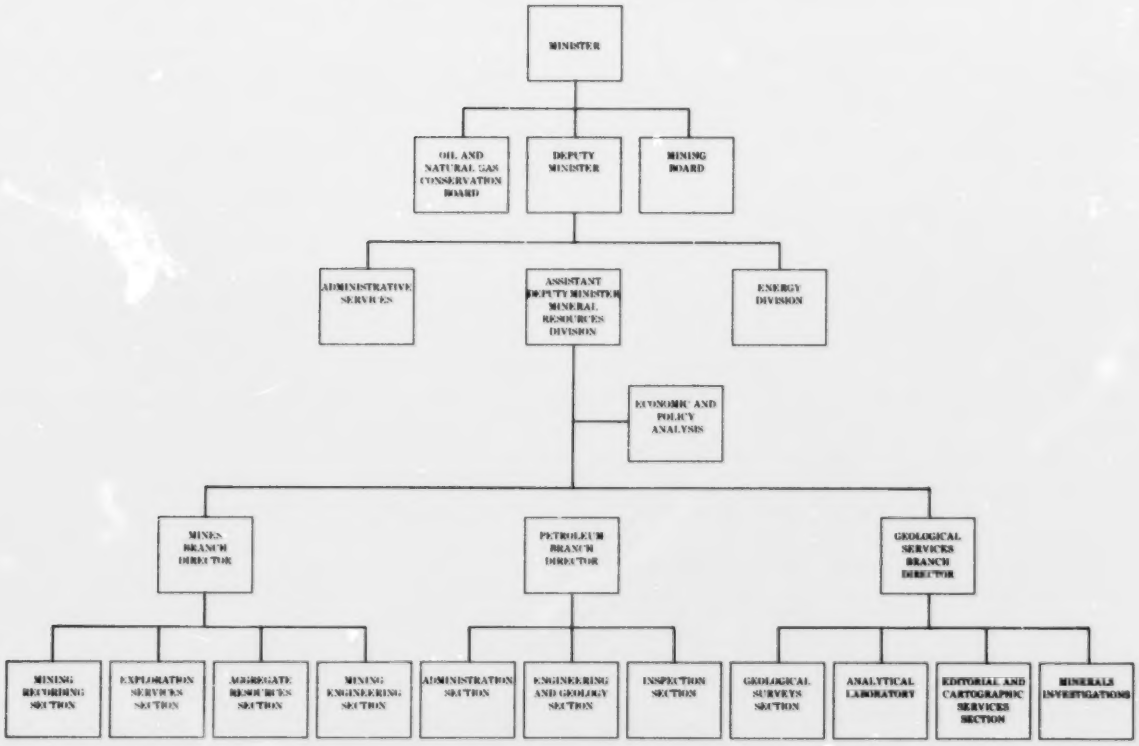
Highlights of the Year

- The value of minerals produced in the province during 1983, including fuels, was $693.6 million, up from $550.8 million in 1982 and $658.1 million in 1981. The increase reflects modest recovery in the mining industry with increased copper, zinc, gold and silver production, and a buoyant petroleum sector.
- Expenditures on mineral exploration during 1983 were estimated at $16.6 million compared with $17.1 million for 1982 and $31.7 million for 1981.
- Staking activity during 1983, as reflected in the area of claims recorded, increased 50% over the previous year. The total area of dispositions in good standing at year end, however, decreased slightly.
- At the mining and processing facilities of Hudson Bay Mining and Smelting Co., Limited in the Flin Flon-Snow Lake area, development of the Rod mine was resumed in June 1983 and production is scheduled for 1984. Sinking of the No. 4 Shaft at Stall Lake was also resumed in June and completed to 1 417 metres by January 1984. Production at the Centennial mine ceased in April 1983 and at the Osborne Lake mine in August. Both mines have been placed on standby.
- In August 1983 Inco resumed work at the new Thompson Open Pit after a one-year postponement.
- In March 1984, the Board of Directors of Sherritt Gordon Mines Limited approved a $27 million mine development program at the Ruttan mine, with the Provincial Government providing a loan of $10 million.
- At the Agassiz mine further exploration and evaluation was initiated in August 1983 under a $2.4 million federal-provincial NEED program which included surface and underground drilling and lateral development on the 800 level.
- In March 1984, an agreement was reached with the Federal Government for funding of a six-month pilot scale spodumene concentrating operation.
- Revenue to the government from mining and quarrying during the year was $35.8 million compared with $1.1 million for the 1982-83 fiscal year.
- Oil and gas exploration again showed a dramatic increase over the preceding year. During 1983, 247 wells were drilled in Manitoba, the highest number in 27 years and a 27% increase over 1982.
- Oil production and value increased for the second consecutive year.
- Provincial revenues from the oil and gas industry increased to $21.7 million from $17.2 million in 1982.
- Two sales of Crown oil leases and exploration reservations during the year generated $1.1 million in revenue to the province.
- In June 1983, the opening of a new District Petroleum Branch Office in Waskada was announced.
- During the year, The Oil and Natural Gas Conservation Board approved a plan by Omega Hydrocarbons Ltd. to construct a $2.5 million gas liquids recovery plant in the Waskada oil field.
- A re-organization of the Geological Services Branch was made during the year. The Branch now comprises four Sections, Geological Survey, Minerals Investigations, Analytical Laboratory and Editorial and Cartographic Services.
- A total of 17 major field projects were undertaken by the Geological Services Branch, augmented by ground and airborne geophysical surveys conducted by the Geological Survey of Canada under the cost-shared Canada/Manitoba Interim Mineral Agreement signed in June, 1983. The principal focus of activities was in the Lynn Lake District.
- In November, 1983, the governments of Canada and Manitoba announced agreement on a five-year (1984-89), $24.7 million Mineral Development Agreement to bolster Manitoba's mineral industry.

Mineral Resources Division

The Mineral Resources Division is responsible for the administration of the provincial Mines Act and Regulations governing the exploration, development and production of provincial mineral resources and the safety and health of the employees in mining, smelting and refining operations; for the conduct of geological investigations directed towards providing a data base for mineral resource exploration, evaluation and development; and for monitoring the effect of provincial mineral policy on the mining and petroleum industries in the province.

Department of Energy and Mines



Economic and Policy Analysis

The function of this section is to undertake analysis and evaluation of the economic and policy impact of provincial, national and international mineral developments on the provincial mineral industry, and to assist in policy development and implementation. Studies conducted by the section contribute to effective management of the provincial mineral resources and the maintenance of appropriate and effective mineral and mineral tax policies. Staffing remained at one Senior Advisor and one Economic Research Analyst.

The section is responsible for the collection and analysis of provincial mining statistics. This function is carried out both by direct provincial surveys of mine and mill production, and through agreements with the Federal Department of Energy, Mines and Resources and Statistics Canada, by undertaking on behalf of these agencies surveys of Manitoba mining and exploration companies. A survey of exploration companies active in the province is conducted by the section in December of each year to provide an estimate of exploration expenditures in the current year and a forecast for the forthcoming year.

Revenue from mining and quarrying collected under the provisions of The Mines Act, The Mining Royalty and Tax Act, and The Mining Tax Act for the fiscal year 1983/84 was estimated at $35,829,233 compared with $1,132,513 for the previous year (see Table 5).

Staff of the section participated in the studies of the Non-Ferrous Smelter Strategy Work Group. This Work Group, which was spearheaded by the federal Departments of Energy, Mines and Resources, and Regional Industrial Expansion, also included representatives from industry and certain provinces. Using selected Canadian non-ferrous smelters as examples, the objective of the study was to identify the elements of a Canadian strategy which would foster an internationally viable and growing non-ferrous metals industry. Manitoba's Flin Flon and Thompson smelters were included in the study which was nearing completion at year end.

Mines Branch

The Mines Branch, through the activities of its component sections, is responsible for administration of matters relating to the operation of mines, including the health and safety of employees of mining, smelting and refining operations; the recording of mineral dispositions; monitoring of exploration activities and reviewing assessment reports; the rehabilitation of mining lands; aggregate resource inventory studies; and the implementation of provincial land use policy concerned with the conservation of aggregate resources.

Mining Recording Section

The Mining Recording Section maintains recording offices in Winnipeg and The Pas to administer regulations under The Mines Act governing the disposition of Crown mineral rights other than oil and natural gas. The regulations enable individuals and companies to acquire claims, permits and leases for the right to prospect, develop and mine Crown minerals. The Mining Recorders and their staff process applications for these mineral dispositions; monitor and inspect the activities of the disposition holders; collect fees, rent, royalties and refundable performance deposits; maintain records; and deal with enquiries relating to these functions.

During calendar year 1983, 891 mining claims were recorded covering a total area of 173 055 hectares, compared with 115 703 hectares in 1982. Mineral dispositions in good standing at the end of 1983 are given in Table 3. Details of Crown mineral dispositions issued during 1983 are given in Table 4.

Total revenue collected by the Section during the fiscal year was $2,174,299, comprising $1,724,526 from dispositions, other fees and rentals; $76,543 from The Mining Claim Lease Tax; and $373,230 from royalties on industrial minerals (see Table 5).

There was a decrease in royalties from industrial minerals production ($373,230 in 1983/84 compared with $463,066 in 1982/83) due to a decline in activity in this sector reflecting the impact of the recession on the construction industry.

Aggregate Resources Section

The Aggregate Resources Section undertakes detailed surficial geological mapping, aggregate resource inventories and prepares quarry mineral land use recommendations based upon provincial land use policies. Resource inventory data and resource management proposals are provided to government, municipalities and private sector users.

Mapping of the Quaternary geology and economic evaluation of sand and gravel deposits were undertaken by staff geologists in the Rural Municipality of Whitemouth, the Local Government District of Alexander, the Rural Municipality of Lac du Bonnet and the Rural Municipality of St. Andrews including a portion of the Rural Municipality of St. Clements. Mapping of surficial geology and an aggregate resource inventory were conducted in the Rural Municipalities of Russell, Silver Creek, Rossburn, Ellice, Birtle, Shoal Lake, and Archie by Gartner Lee Associates Limited under contract to the Mines Branch.

In reponse to requests from Municipal Planning Districts, recommendations for the protection of quarry mineral resources were presented to the Rural Municipality of Woodlands and Rural Municipality of La Broquerie Planning Districts in the Eastern Interlake area. Basic Planning Statements were prepared for the villages of Ste. Rose du Lac and Ste. Anne. The recommendations and planning statements were supported by technical background reports and maps illustrating the proposed planning status of each economic quarry mineral deposit. Guidelines were provided for the rehabilitation of depleted pits and quarries. In addition, two presentations were made at municipal council meetings concerning the protection of quarry mineral resources. An estimated 1 500 land subdivisions were reviewed of which 40 subdivisions conflicted with mineral extraction and development and required detailed evaluation by Section geologists. All proposed Crown land transfers and zoning by-law amendments were reviewed and, where necessary, recommendations made to minimize potential conflicts with mineral extraction.

Two Geological Reports, four Open File Reports and three Preliminary Maps, were released during the year. Publications, presentations and preliminary maps by the Section are listed in Tables 9 and 10.

Exploration Services Section

The Exploration Services Section, formerly the Geoscience Data Section, provides support services to mining companies and prospectors engaged in mineral exploration in Manitoba. The Section assesses reports of exploration work on mineral dispositions for compliance with the requirements of regulations under The Mines Act and disseminates non-confidential data; distributes geological publications; collects and stores diamond drill core; compiles and disseminates exploration and mineral deposit data; monitors, promotes and documents exploration activity in the Province; performs land-use, mineral potential (capability) studies; and maintains the divisional library and divisional mailing list.

During the fiscal year, 245 reports of exploration work were received and assessed; 329 files were microfilmed; 94 reports were added to the non-confidential files; 825 files were reproduced for the private mining sector; 1 903 open files were examined by mining industry personnel, 814 by Divisional staff, and 257 visits were made by mining company presonnel. The master "Index to Non-confidential Assessment Reports", compiled from the CLASS computer file of exploration data, was updated and a supplement was issued in November. A total of 650 maps showing the areal extent of non-confidential exploration work was compiled at the same scale as claim maps (1:31 680).

During the year 933 orders for geological publications and maps were received. A total of 2 296 reports and maps was sold, generating $8,334.20 in revenue. Publication release notices were mailed to the 600 addresses on the mailing list.

A total of 25 242 metres of core was collected during the year under the diamond drill core acquisition and storage program . As of March 31, 1984, the Province's drill core inventory was 145 751 metres, stored at four regional core libraries — Lynn Lake (25 355 metres), The Pas (65 756 metres), Thompson (34 454 metres) and Winnipeg (20 186 metres). Core is provided on a voluntary basis by mineral exploration companies and prospectors who, in turn, receive assessment work credits for the transportation costs. The non-confidential core is available for examination, thereby eliminating the need for costly duplication of diamond drilling, and allowing for more productive use of exploration dollars.

Exploration activity summaries were compiled for the Western Miner, Northern Miner, Annual Prospector's and Developer's Association Meeting and the C.I.M. Directory. Displays depicting the work of the Section were presented at the Division's Annual Meeting with Industry, the Prospectors and Developers Association's Annual Meeting in Toronto, the C.I.M.'s 85th Annual General Meeting, the Manitoba Schools Careers Symposium and at the Norway House Careers Days.

The Section was responsible for examining land-use requests in order to avoid future conflicts in areas of high metallic mineral potential. Mineral potential (capability) maps were prepared in response to specific requests and staff served on land-use committees.

Mining Engineering and Inspection Section

During the year, the Mining Engineering and Inspection Section continued to administer regulations under The Mines Act governing the operation of mines and the rehabilitation of quarries, and to enforce The Workplace Safety and Health Act and regulations at mines. These functions were carried out by District Mining Engineers located in Winnipeg, Flin Flon and Thompson, and by Mines Inspectors located in Winnipeg, Thompson, Flin Flon, Snow Lake, Leaf Rapids and Dauphin.

In 1983, 2 782 inspections and investigations were conducted to determine compliance with The Mines Act and Regulations and The Workplace Safety and Health Act, and to investigate reported dangerous occurrences. A total of 89 environmental surveys was conducted to assess in-plant environmental conditions as well as 21 inspections of abandoned mines. Two prosecutions were initiated but the charges were stayed when the mine ceased operation: an appeal on a prior prosecution was unsuccessful.

The Section continued to monitor the adequacy of mine rescue facilities at mines and during the year 131 mine rescue personnel were given mine rescue training.

During 1983, four rehabilitation plans for commercial quarries were received and appraised and 643 casual permits for removal of Crown quarry minerals were issued. Background information and recommendations relating to quarrying and rehabilitation were provided to four Municipal Planning Districts.

As of April 1, 1984 responsibility for safety and health of workers at mines was transferred to the Workplace Safety and Health Division of the Department of Environment and Workplace Safety and Health.

The Mining Industry
Mineral Production

The value of mineral production, including metals, industrial minerals and fuels, for the 1983 calendar year was $693.6 million compared to $550.8 million for 1982, an increase of 26%. This gain in value reflects increased copper and zinc production resulting mainly from the continuous operations of producers throughout 1983 in contrast to the extended production shutdowns experienced during 1982 (see Tables 1 and 2 in Statistical Supplement).

At $471.1 million (up 33.4%), metals accounted for 68% of the total value of Manitoba's 1983 mineral production. The value of the more significant metals produced during 1983 were: nickel $206.9 million (up 20.5%); copper $140.3 million (up 47.3%); zinc $56.3 million (up 58.1%); gold $36.7 million (up 42.1%); silver $15.0 million (up 86.6%).

Mining and Processing Operations
Base Metals

Mining operations in Manitoba are located in the Flin Flon-Snow Lake area, the Lynn Lake-Leaf Rapids area, and at Thompson, Bernic Lake and Bissett (see Map 1).

Hudson Bay Mining and Smelting Co., Limited operates a number of mines in the Flin Flon-Snow Lake area, concentrators at Flin Flon and Snow Lake, and smelting (copper) and refining (zinc and cadmium) facilities at Flin Flon. Besides treating ores from the company's own mines, concentrates of other operators, mainly Sherritt Gordon Mines Limited and the Trout Lake mine, are also processed. The main products from the complex are anode copper, refined zinc, refined cadmium and lead concentrate. At the end of 1983, approximately 1 800 people were employed at the company's mines and processing facilities in Manitoba. (An additional 420 people were employed at company operations on the Saskatchewan side of the border).

In the Snow Lake area, the company operates five mines and is developing a sixth, the Rod mine. The 3 447 tonne per day concentrator at Stall Lake, which was inaugurated in June 1979, produces copper and zinc concentrates which are shipped to Flin Flon for further processing, and a lead concentrate which is shipped to Trail, B.C.. The *Chisel Lake, Ghost Lake, Stall Lake, Anderson Lake* and *Spruce Point mines operated continuously, while operations at the Osborne Lake Mine* were suspended in August and the mine was placed on standby. Development of the *Rod Mine* was resumed in June, with production scheduled for 1984. Sinking of the No. 4 Shaft at Stall Lake Mine was resumed in June 1983 and completed to 1 417 metres by January 1984.

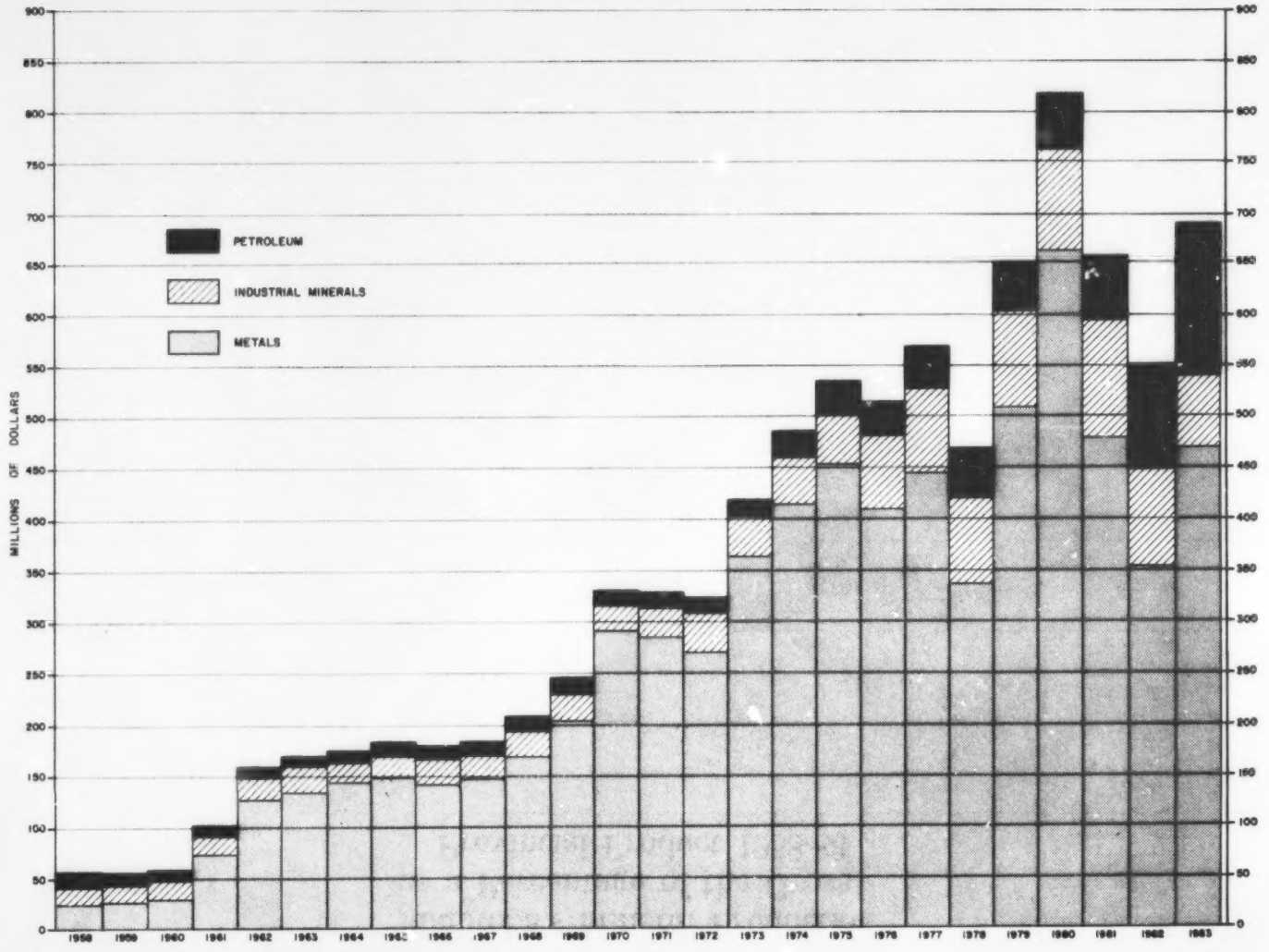
In the Flin Flon area, normal operations continued at the *Westarm*, and *Flin Flon* mines. The *Trout Lake Mine*, operated under a joint venture agreement (Hudson Bay Mining and Smelting Co., Limited 44%, Scandinavian Minerals Syndicate 29%, and Manitoba Mineral Resources Ltd. 27%) produced at the scheduled capacity of 1 633 tonnes per day. Operations at the *White Lake Mine* were terminated and the shaft capped in November 1982, while the *Centennial Mine* ceased production in April 1983 and has been maintained on a standby basis.

Inco Limited operates two mines and a concentrator, smelter and nickel refinery at Thompson. Ore production during 1983 came from the Thompson Mine and Pipe #2 Open Pit. The *Birchtree Mine* continued to be maintained on a standby basis. The main product from the Thompson complex is electrolytic nickel. By-products include copper matte, cobalt oxide and pentlandite concentrate. Copper matte is shipped to the company's refinery at Copper Cliff, Ontario, while commercial grade cobalt oxide is shipped to the company's refinery at Clydach, Wales, where refined cobalt oxides and salts are produced. Pentlandite concentrates are sold as feed for Sherritt Gordon's nickel refinery at Fort Saskatchewan, Alberta.

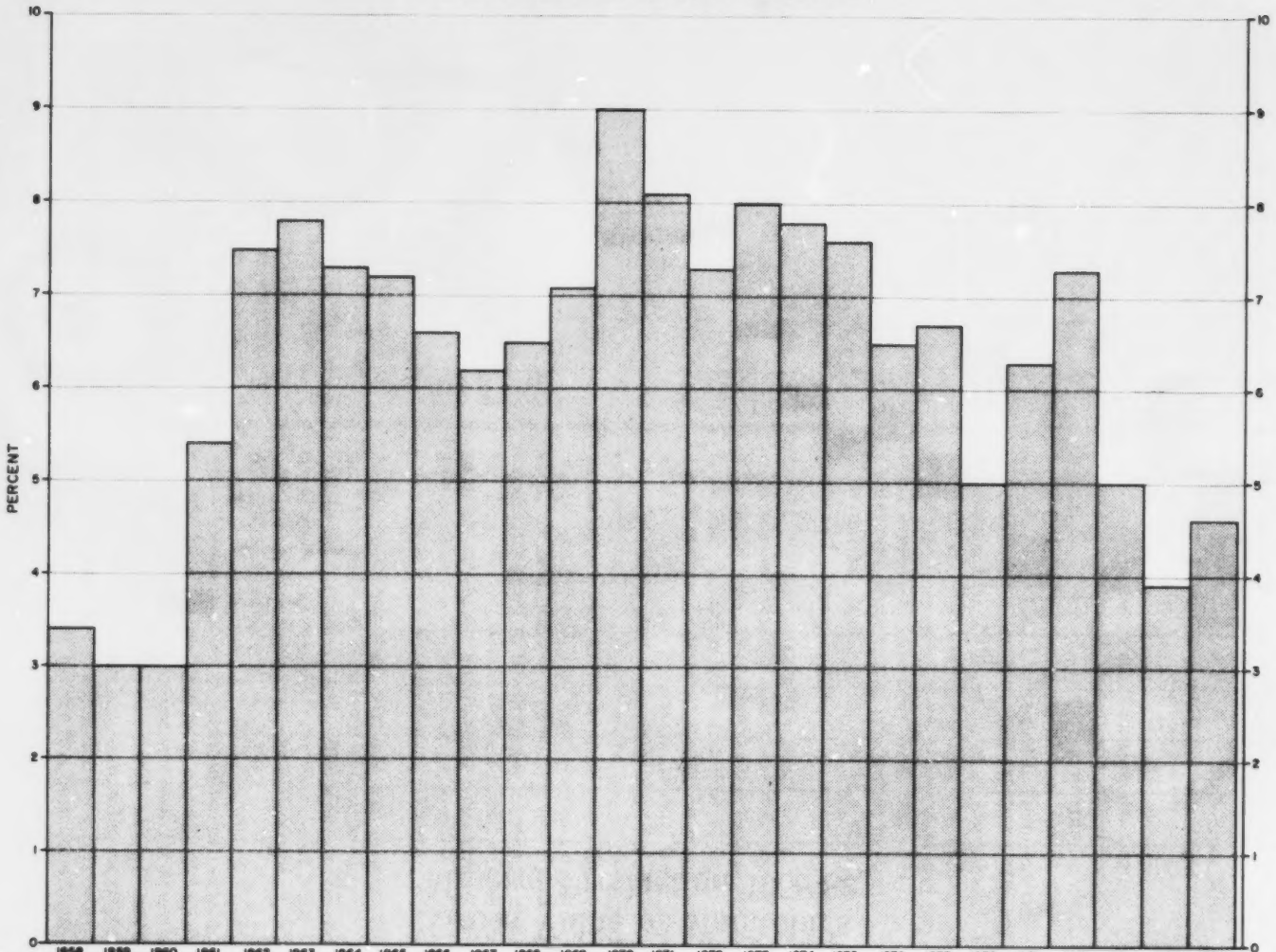
A four-day-week work schedule was maintained until the vacation shutdown of four weeks, ending on August 8, 1983, after which a five-day work week was resumed. An average of 2 100 persons were employed at the company's Manitoba operations during 1983.

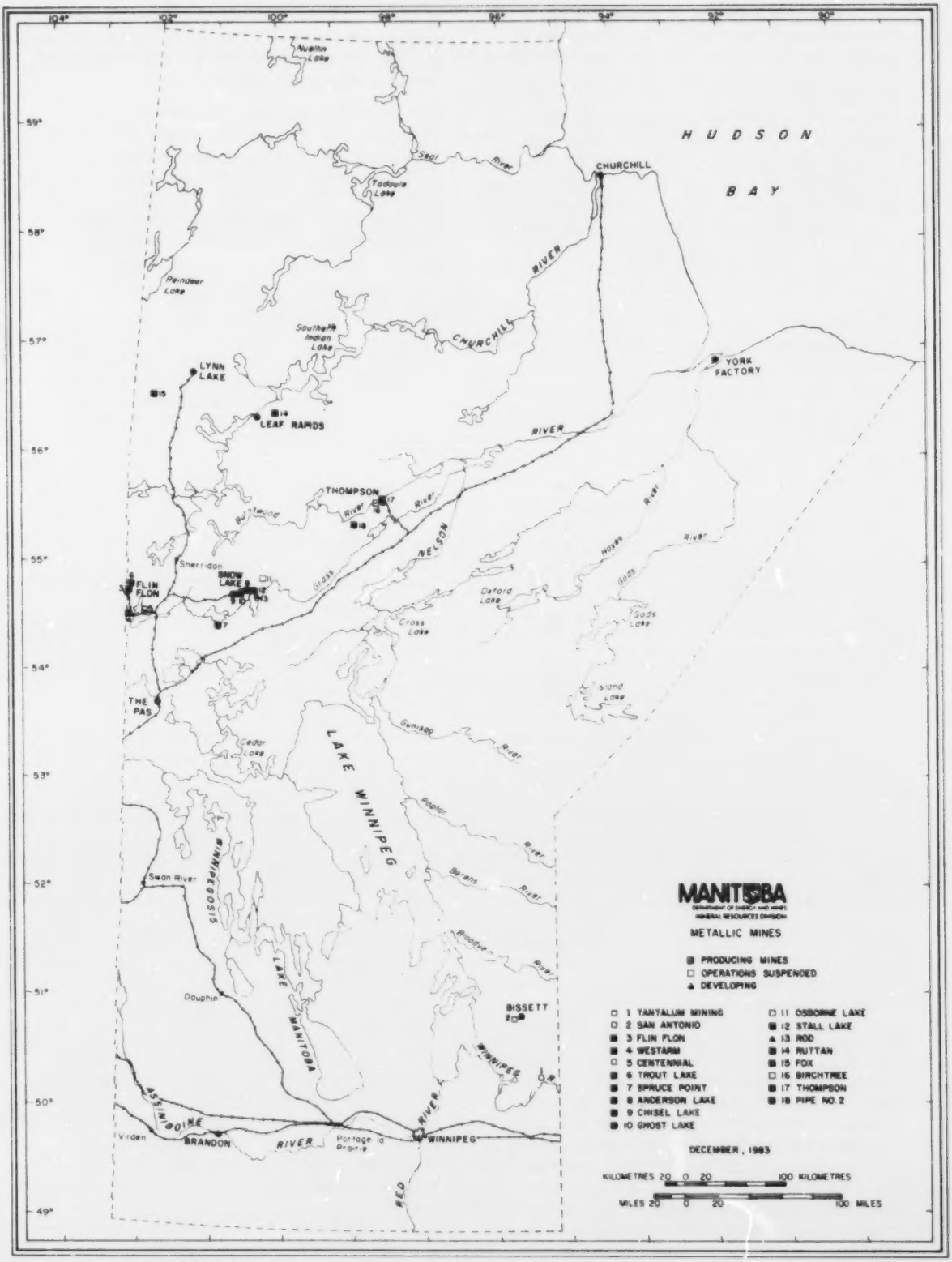
The *Thompson Mine* is serviced by two shafts, the T-1 shaft to the 4340 level and the T-3 shaft to the 2600 level. The *Pipe #2 Open Pit Mine* is 610 metres long, 488 metres wide and will have eighteen 12-metre benches to an ultimate depth of 219 metres. A 6.7 metre diameter concrete-lined shaft to 1 097 metres has been completed at this mine. During 1983, it was used mainly to service pumping facilities on the 1500 level to provide drainage for the open pit.

Gross Value of Manitoba's Mineral Production 1958-83



Manitoba's Mineral Production as a Percentage of the Gross Provincial Product 1958-83





Map 1. Location of Metallic Mines

In October 1981, Inco had announced the development of an open pit at Thompson to replace the Pipe Open Pit. The development of the first phase of the project, estimated to cost $87-$90 million, was deferred in July, 1982 for one year due to depressed nickel market conditions. The first phase of development, which includes the removal of 2.0 million cubic metres of overburden, will permit mining of a portion of the Thompson ore body to a depth of 122 metres. Dredging resumed in August 1983 and is scheduled to continue until mid-1985. Production from the first phase is to commence early in 1986.

Sherritt Gordon Mines Limited operates two mines and concentrators in the Lynn Lake-Leaf Rapids area.

Production at the *Fox Mine*, located 48 kilometres southwest of Lynn Lake commenced in 1970. Mining is from blast-hole stopes with an adaptation of this method for pillar recovery. Ore below the 2000 level, the lowest level serviced by the shaft, is developed by a ramp which extends to the 2800 level. To facilitate hoisting of ore from this area, a 2.4 metre diameter borehole was equipped for hoisting ore to the 2000 level. The concentrator at this mine produces copper and zinc concentrates which are trucked to load-out facilities at Lynn Lake for rail shipment to Flin Flon for further processing. Ore reserves at this mine, as of January 1, 1984, were estimated at 1.2 million tonnes averaging 2.47% copper and 1.58% zinc. The Fox Mine is scheduled to close in the fall of 1985, when ore reserves will have been mined out.

The *Ruttan Mine*, located 96 kilometres southeast of Lynn Lake, commenced production in 1973 from an open pit. In 1974, development of the underground mine was initiated with a decline and conveyorway. The decline was extended to the 1400 level and a service shaft sunk to the 1000 level. In 1980 this shaft was extended to the 2230 level to permit detailed subsurface drilling of the downward extension of the orebodies.

Further deepening of the shaft to the 3000 level was started in August 1983 and was essentially completed by March 1984. Deepening of the shaft will permit Sherritt to carry out a deep drilling exploration program below the 2600 level, as well as allow for development and mining of the Ruttan orebody between the 1400 and 2600 levels. In March 1984, Sherritt's Board of Directors authorized a $27 million development program between the 1900 and 2600 level, with the provincial government providing a loan of $10 million.

Copper and zinc concentrates produced by the mill are trucked to Lynn Lake for rail shipment to Flin Flon where both zinc and copper concentrates are treated.

At December 31, 1983, ore reserves at the Ruttan Mine, included in current mine plans, were estimated at 14.8 million tonnes grading 1.72% copper and 1.06% zinc. Approximately one third of this ore is in the developed area of the mine above the 1400 level, with the remainder located between the 1400 and 2600 levels. The ore zone is open at depth.

In 1979 Sherritt Gordon Mines Limited acquired an option on the *Agassiz gold property*, now held by Comiesa Corporation, a subsidiary of Agassiz Resources Ltd. Sherritt Gordon Mines Limited carried out surface diamond drilling in 1980 and continued the evaluation in 1981 by deepening the shaft to 255 metres and establishing a new exploration level at 244 metres to permit deeper drilling. This program was completed in June 1982, and the shaft allowed to flood.

Under a $2.4 million NEED program, with financial support from the federal and provincial governments, further exploration was initiated in August 1983, which included surface and underground diamond drilling and underground lateral development on the 244 metre level. As of March 31, 1984, the program was continuing, though behind schedule.

Tantalum Mining Corporation of Canada Limited (TANCO) – The operations of Tanco remained shutdown during 1983 as high inventories of tantalite and poor market conditions continued.

In March 1984, an agreement was reached with the Federal Department of Regional and Industrial Expansion for funding of a pilot scale spodumene operation. The pilot plant is to operate at 91 tonnes per day during a trial period of six months to confirm the concentrating process and to develop markets for the product. A workforce of 27 will be required.

Ore reserves remain unchanged at 981 000 tonnes of tantalite ore with a drill indicated grade of 0.138% Ta_2O_5 and 637 000 tonnes of stored tailings grading 0.065% Ta_2O_5. Lithium and cesium ore reserves are reported as 7 031 000 tonnes grading 1.76% LiO_2 and 272 000 tonnes grading 23% Cs_2O, respectively.

Precious Metals

San Antonio Joint Venture Ltd.

In August 1980, *Brinco Mining Ltd.* and New Forty-Four Mines Limited signed a joint venture agreement to reactivate the San Antonio gold mine in Bissett. The former operation, which initially began production in 1932, had been dormant since 1968 when a fire destroyed the hoistroom. The mine is developed by a shaft and three winzes to a total depth of 1 518 metres.

In 1982, the original joint-venture arrangement between Brinco and New Forty-Four Mines Ltd. was renegotiated. Under the new arrangements, Brinco's interest in the mine was increased from 50% to 100% with New Forty-Four Mines Ltd. retaining a 10% net profits interest, payable after Brinco has recovered its costs associated with development and operation of the mine.

The mine was operated during 1982 and until May 1983 when production was suspended. In June 1983, an exploratory drilling program was carried out by Brinco following which all operations were terminated.

In January 1984, Lathwell Resources Ltd. concluded an agreement with Brinco for the exploration and development of the mine, whereby Lathwell can earn a 50% working interest in the assets of the mine. Lathwell can earn its interest in increments by the expenditure of $7.5 million on exploring and developing Brinco properties over a period of 4½ years.

Whiteshell Resources Ltd. completed exploration and feasibility studies on its properties near Star Lake in the Whiteshell Park. A detailed development program was submitted for review by the Parks Branch of the Department of Natural Resources. A work permit was issued in February 1984, for a mining operation in the Park with ore to be trucked to a milling site outside the Park boundaries. Financing arrangements are being pursued.

Industrial Minerals/Structural Materials

The production and value of industrial minerals and structural materials for 1983, are given in Table 1 in the Statistical Supplement.

A large face-brick plant at Lockport, near Winnipeg, is operated by Red River Brick and Tile Co., using stoneware *clay* from the Ste. Rose du Lac area, *shale* from the Pembina Mountain area, and sand from local sources. The plant supplies bricks for the mid-Canada and central-northern United States markets.

Non-swelling bentonite, used mainly in clarification of petroleum and vegetable oils, is mined by Pembina Mountain Clays Inc. near Morden and shipped to the company's plant in Winnipeg for treatment with sulphuric acid to increase the absorbency of the clay. Pembina Mountain is the only producer of non-swelling bentonite in Canada.

Gypsum is produced by Domtar Construction Materials Ltd. at Gypsumville for use in the company's wallboard plant in Winnipeg. Westroc Industries Ltd. also produces gypsum at Harcus, near Amaranth for its wallboard plants in Winnipeg and Saskatoon.

Portland Cement production comes from the plant of Genstar Cement Limited at Fort Whyte, using local clay and silica sand and limestone quarried at Steep Rock. Limestone is also quarried north of Mafeking by Genstar, to supply the company's cement plant at Regina.

Steel Brothers Canada Ltd. produces *lime* from kilns at Winnipeg and Faulkner. *Limestone and dolomite* are quarried at Garson for *building stone*, and crushed rock is produced by numerous operators in the Interlake region and elsewhere. Cold Spring Granite (Canada) Limited and Midwest Quarries Ltd. operate *granite* quarries in the Lac du Bonnet area primarily for use as building stone. High quality *silica sand* quarried from Black Island in Lake Winnipeg by Steel Brothers, is exported for use in glass-making, as foundry sand, for sand blasting, and as a filtering medium.

Peat moss is produced from sphagnum bogs in southeastern Manitoba and used for horticultural purposes. Fisons Western Corporation operates four bogs near Moss Spur, Julius and Elma. In 1983, a fifth bog near Giroux was brought into production by Premier West Peat Moss Ltd. Both companies produce a "value-added" product, combining fertilizer with the peat moss.

Mineral Exploration

Expenditures on mineral exploration in Manitoba during 1983 totalled $16.6 million, a decline of 3% from the $17.1 million recorded in 1982. The 1981 figure was $31.7 million. The low levels of expenditures on mineral exploration during 1982 and 1983 are a direct reflection of the effects of the recession, felt not only in Manitoba but throughout Canada.

The total area of claims recorded in the province during 1983 increased 50% to 173 055 hectares from 115 703 hectares in 1982. Mineral dispositions (which include claims, permits and leases) in good standing at the end of 1983 totalled 1 000 557 hectares compared with 1 131 732 hectares at the end of 1982.

As has been the pattern in Manitoba in recent years, exploration for base metals and gold continued to dominate exploration activity, particularly in and around the existing mining areas. There was also renewed interest in chromite, pegmatite minerals and potash.

Base Metals

In the *Flin Flon- Snow Lake Belt*, exploration activities included geological, geophysical and diamond drilling programs. Companies active in this area were Hudson Bay Exploration and Development Company Limited, Granges Exploration AB, Falconbridge Limited, Gold Fields Canadian Mining Ltd., Selco Inc., Cominco Ltd., Manitoba Mineral Resources Ltd., Nor-Acme Gold Mines Limited, W. Bruce Dunlop Ltd., Geosearch Consultants, Dearin Geological Consulting Limited, Elbow Lake Mines Ltd., and local prospectors. Drilling programs were carried out by Hudson Bay Exploration, Granges Exploration, Falconbridge and Selco.

In the *Lynn Lake Belt*, exploration for base metals included geology, geophysics, geochemistry and diamond drilling. Active companies included Sherritt Gordon Mines Limited, Manitoba Mineral Resources Ltd., Hudson Bay Exploration and Development Company, Limited, Selco Inc., Falconbridge Limited, and File Explorco.

Some grassroots geology and prospecting for base metals were undertaken in the more remote belts of *Northern* and *Central Eastern Manitoba* by Noranda Exploration Company Limited, Barringer Magenta, W. B. Dunlop Ltd. and Manitoba Mineral Resources Ltd. In and around the *'Thompson Nickel Belt'*, Inco Limited, Granges Exploration AB and Canamax Resources Inc. were active. Some interest in lead/zinc in *Paleozoic* carbonates was revived, as well as in the potential of the Precambrian basement below the Paleozoic south of the Flin Flon Belt and in the Fisher Branch area west of Lake Winnipeg.

In *Southeastern* Manitoba, File Explorco (Selco) and Manitoba Mineral Resources Ltd. were engaged in a regional joint venture base metal program in an area to the west of Lake of the Woods.

Tantalum, Chromite

In the Bird River area of southeastern Manitoba, Tantalum Mining Corporation of Canada Limited continued prospecting and drilling activities for pegmatite minerals while Dynamic Mining Exploration Ltd. carried out a magnetometer survey on its Euclid Lake chromite property.

Gold

A high level of gold exploration continued in the province during 1983.

In the *Flin Flon-Snow Lake Belt*, exploration activities for gold included geological, geophysical and diamond drilling programs. Active companies included Hudson Bay Exploration and Development Company Limited, Granges Exploration AB, Gold Fields Canadian Mining Ltd., Selco Inc., Cominco Ltd., Nor-Acme Gold Mines Limited, Ray-Dor Resources Ltd., Elbow Lake Mines Ltd., W. Bruce Dunlop Limited as well as several prospectors.

In the *Lynn Lake Belt*, under a Federal/Provincial NEED program, Sherritt Gordon Mines Limited commenced, in August 1983, a two phase, $2.4 million program for detailed evaluation of the Agassiz gold property near Lynn Lake. Manitoba Mineral Resources Ltd. launched a program to examine the potential extension of the Agassiz mineralization which included prospecting, geology and geochemistry. Sherritt Gordon also conducted IP surveys of a number of gold prospects. South of Lynn Lake, W. Bruce Dunlop Limited was active in the Beaucage Lake area, and northeast of Leaf Rapids, Gossan Resources Limited prospected and sampled for gold.

In *Central Eastern Manitoba*, Arbor Resources Inc. drilled the Assean Lake property optioned from Nor-Acme Gold Mines Limited. BP Minerals Ltd. continued its program at Island Lake. J. R. Woodcock Consultants Ltd. with

Norontex Exploration examined properties in the Island Lake area. Local prospectors were also quite active at Island Lake.

The *Rice Lake Belt* and surrounding areas of *Southeastern Manitoba* were the most active in the province for gold exploration, with the involvement of many junior companies and prospectors. Companies conducting various geological, geophysical and diamond drilling programs included Brinco Mining Limited, which carried out an exploration drilling program of the lower levels of the San Antonio mine; Argenta Resources Ltd., Grande Trunk Resources Inc., New Magnus Red Lake Gold Mines Limited, Quadrat Management, Kangeld Resources Ltd. and Canadian Nickel Company Limited.

Potash

During 1983 Canamax Resources Inc. completed a five hole drill program which confirmed and increased its potash reserves in the Russell-Binscarth area. Canamax has outlined a deposit reported to contain an in-situ reserve of 440 million tonnes averaging 25.4% K_2O as sylvite. As of March 31, 1984, information was being compiled for pre-feasibility studies and discussions were initiated between Canamax, the Province of Manitoba and other potential co-venturers for development of this deposit.

Petroleum Branch

The Petroleum Branch administers those provisions of The Mines Act, The Pipe Line Act and The Gas Storage and Allocation Act relating to exploration, development, production and transportation of crude oil and natural gas. In addition, the Branch provides assistance to the Department of Finance in administering The Oil and Natural Gas Tax Act and liaises with The Surface Rights Board on surface rights matters.

One of the major functions of the Branch is to develop, recommend, and administer policies and legislative changes to encourage exploration and development of the Province's crude oil and natural gas resources in an orderly, safe and efficient manner. The Branch also conducts technical studies and provides technical assistance to The Oil and Natural Gas Conservation Board in matters relating to salt water disposal, enhanced recovery projects, unitization agreements, and other Board responsibilities.

Through the collection and analysis of petroleum industry statistics, and the monitoring of federal-provincial policies, the Branch is able to evaluate the effects of these policies on the petroleum industry and to make recommendations for responsive action by senior management.

The Branch releases several reports during the year which provide the public, industry and government with information regarding the petroleum industry's performance in Manitoba.

The Branch comprises three Sections, Administration, Engineering and Geology, and Petroleum Inspection. Each section has specific responsibilities relating to the overall function of the Branch.

The *Administration Section* of the Petroleum Branch administers regulations under The Mines Act governing the disposition of Crown oil and natural gas rights in Manitoba and the collection of Crown oil and natural gas royalties. These responsibilities include the holding of Crown lease and exploration reservation sales, the collection of annual rentals and enforcement of provisions under the Crown Leasing and Royalty Regulations.

The Section also administers the Manitoba Drilling Incentive Program and is responsible for the compilation of monthly production and disposal/injection data on all active wells in the Province. This information is published monthly and annually.

The Section administers Manitoba's oil price supplement programs, namely the New Oil Reference Price (NORP) and Special Old Oil Price (SOOP), with funding from the Federal Government. NORP and SOOP supplements are distributed on a monthly basis to Manitoba producers.

The oil export charge revenue-sharing program allows for the 50/50 sharing with the Federal Government of the tax on oil exports attributable to Manitoba. The Section calculates Manitoba's share of joint Manitoba/Saskatchewan streams according to agreements reached by all parties.

In addition to internal administrative functions, the Section also handles all financial functions of the Branch including the collection of registration, license and subscription fees and technical service charges.

The *Engineering and Geology Section*, located in Winnipeg, administers regulations under The Mines Act relating to petroleum drilling and production operations. As part of this responsibility, the Section processes drilling license applications as well as applications to recomplete, suspend or abandon wells. In addition, the Section provides technical support to The Oil and Natural Gas Conservation Board in the processing of applications for salt water disposal, pressure maintenance, gas conservation, and unitization.

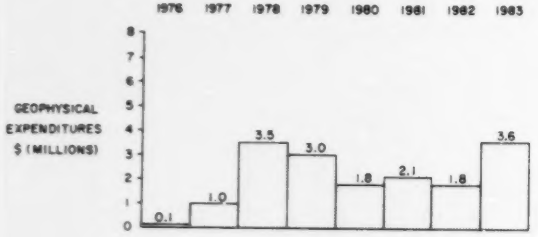
The Section conducts technical studies, primarily concerned with oil and gas reserves, enhanced recovery potential, and the hydrocarbon potential of Manitoba, and provides a consultation service and a source of information for the petroleum industry and the general public. This Section is responsible for the administration of the Geophysical Regulations and for the designation and revision of new and existing field and pool boundaries.

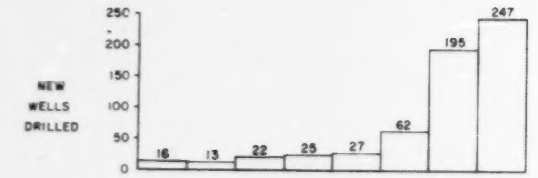
In performing its duties pursuant to The Mines Act, the Section encourages the maximum economic recovery of Manitoba's petroleum resources with a minimum impact on the environment.

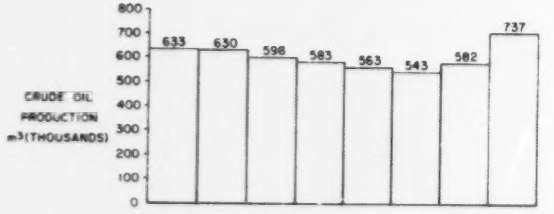
The *Inspection Section*, with district offices in Virden and Waskada, is responsible for enforcement of regulations under The Mines Act relating to geophysical, drilling, production and pipe line operations. Section personnel inspect field facilities, investigate complaints, witness specific operations and interpret and communicate departmental or regulatory requirements to industry operating personnel.

The Section is also engaged in research to evaluate various techniques for reclaiming soil which has been contaminated by oil or salt water spills.

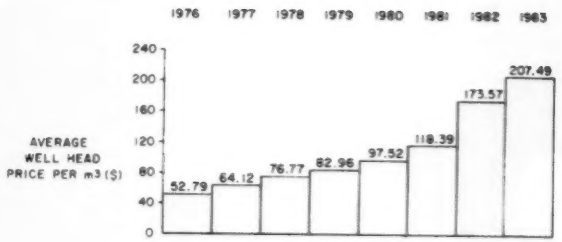
Performance of the Petroleum Sector 1976-83

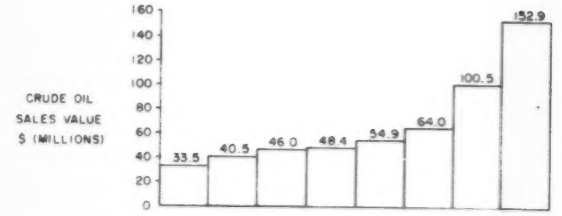


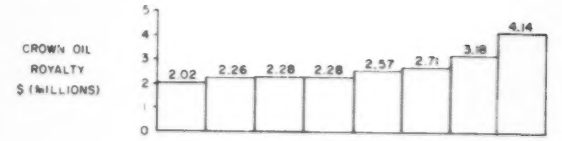


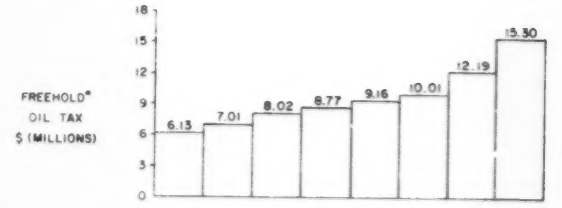


* APPROXIMATELY 80% OF OIL PRODUCTION IS FROM FREEHOLD MINERAL RIGHTS









The Petroleum Industry

Crown Oil and Natural Gas Lease Sales

Two Crown oil and natural gas lease sales were held in 1983. Sixty-six leases covering 9 255 hectares were sold for a total of $1,058,705.

In the first lease sale, held on May 11, 1983, the average bonus price paid per hectare was $146.73, whereas in the October 12, 1983 sale, the average bonus price decreased to $84.24 per hectare.

The highest price in the May sale was $762.34 per hectare for a 64 hectare parcel in the Lyleton area. The highest price in the October sale was $520.00 per hectare for a 64 hectare parcel located approximately 10 km southwest of St. Lazare. Neither of these prices exceeded the records set in 1982.

Only one exploration reservation was sold in 1983. In the May sale a 1 024 hectare reservation was purchased for $41,722. This was the first exploration reservation sold since the October 28, 1981 land sale when four exploration reservations were sold.

Since Crown oil and gas lease sales resumed in 1979, the province has received $6,816,795 in revenue from the disposition of Crown oil leases and exploration reservations.

Crown Oil and Natural Gas Leases

As of December 31, 1983, the total area of Crown oil and natural gas rights under disposition was 71 958 hectares. Of this total, 57 462 hectares were held under lease and 14 496 hectares under exploration reservations.

On December 31, 1982, deeper rights renewal provisions came into effect for pre-1979 leases. Under these provisions, non-productive areas and rights below the producing formation revert to the Crown at the end of the lease term. Up to December 31, 1983, these regulatory termination provisions resulted in 3 644 hectares being terminated. The cancelled rights again become available for leasing by other parties interested in actively developing them. A lease may be extended for further periods of one year each if a rental penalty is paid and a commitment to a drilling program is made. In 1983, two such leases were extended.

Revenue to Freehold Mineral Owners

More than 80% of the mineral rights in southwestern Manitoba are privately owned (freehold), and it is estimated that gross royalties payable to these owners on oil production in 1983 exceeded $16 million (before payment of provincial and federal taxes). In addition there are initial signing bonuses and delay rental payments for new and non-producing leases.

Geophysical Activity

Fourteen geophysical licenses were issued in 1983. It is estimated that programs covered approximately 3 875 kilometres, making 1983 one of the most active years for geophysical exploration activity in the Province's history. The estimated cost of these programs was $3.6 million, representing a 102% increase over actual 1982 program costs.

In 1983, geophysical programs were carried out in the following areas of the province: Daly, Elva, Tilston, North Tilston, Goodlands, Whitewater, Waskada, Hartney, Oak Lake, Kirkella, Bede, Pierson, Mountainside, Virden, Souris, and Napinka.

Drilling Activity

In 1983, 27 different oil companies drilled wells in Manitoba's oil patch. This represented a 42% increase over the number of companies drilling wells in 1982. Fourteen drilling contractors with 24 drilling rigs drilled 247 wells, for a total depth of 229 304 metres. Drilling activity in 1983 surpassed 1982 levels by 27% and 1981 levels by 298%. Of the total number of wells completed in 1983, 190 were classified as development wells, while the remaining 57 were exploratory.

The success rate of wells drilled was also very high. Ninety percent (223 wells) of the 247 wells drilled were completed as potential oil wells. Three oil companies accounted for 56% of all wells drilled: Omega Hydrocarbons Limited (97 wells or 39%), New Scope Resources Limited (26 wells or 11%) and Roxy Petroleum Ltd. (16 wells or 6%). These same companies also accounted for the majority of drilling in 1982.

For the third successive year most of the drilling activity in the province took place in the Waskada area, (56% or 138 wells). Most of the remaining 109 wells were located in the Pierson, Daly, Virden, Coulter, Tilston, and Whitewater areas.

Production

Annual oil production in Manitoba reached 737 052 m^3 (4.64 million barrels) in 1983, representing a 27% increase over 1982 and a 36% increase over 1981 production. For the second consecutive year since 1968, oil production increased.

Oil production had been declining at approximately 3.5% per year from 1969 to 1981. The increased oil output since 1982 can be attributed mainly to the successful and continuing development of the Waskada area.

Production from the Waskada area increased from 85 666 m^3 (540,000 barrels) in 1982 to 240 164 m^3 (1.6 million barrels) in 1983, an increase of 198%. The average daily production from this area as of December, 1983 was approximately 800 m^3 (5,000 barrels).

In 1983, 292 750 m^3 (40% of total production) was classified as "New" oil and of this total, approximately 80% was produced from the Waskada Field.

In December 1983 approximately 60% of the oil production in Manitoba was classified as "Old" oil whereas in 1982 "Old" oil accounted for 81% of total production. This trend of a decline in "Old" oil production, as "New" oil production increases its share of total production, is expected to continue.

Oil Prices

The price of "New" oil (D2S3 quality block) in January, 1983 was \$274.03/m^3 (\$43.55 per barrel). "New" oil prices declined steadily throughout 1983 until November when prices increased for the first time since October 1982. "New" oil prices ended the year at \$241.70m^3 (\$38.41 per barrel).

Compared with 1982, "Old" oil prices were significantly higher. On January 1st, 1983, the selling price of "Old" oil (D3S4 quality block) increased by \$36.23/m^3 (\$5.76 per barrel) to \$184.65/m^3 (\$29.35 per barrel). By December 1983, "Old" oil prices had increased to \$185.02/m^3 (\$29.40 per barrel).

Following the amendment of pricing agreements between the Government of Canada and the producing provinces, effective July 1, 1983, all wells previously qualifying for Special Oil Prices began receiving supplements equal to the New Oil Reference Price.

Value of Production

The total value of oil production during 1983 was \$152.9 million, a 52% increase over 1982 production and a 138% increase over production in 1981. The main reasons for the increase were the increased production levels and higher "Old" oil prices.

Provincial Revenue from Oil Production

For a second consecutive year Provincial government revenues from oil production increased due to higher production levels and higher wellhead prices. The Manitoba government collected approximately \$21.7 million in revenues (\$4.2 million in Crown oil royalties, \$15.3 million in freehold oil taxes, \$1.1 million in Crown lease sales bonuses, rentals and fees, and \$1.0 million in the province's share of crude oil export taxes) resulting in a 26% increase over 1982. These figures do not include provincial revenues in the form of corporate capital tax, sales tax, municipal tax and corporate and individual income tax.

Municipal Tax Assessments

Oil producers in Manitoba pay a municipal tax on wells and associated production facilities, including: oil wells, batteries, salt water disposal wells, salt water disposal plants, water injection wells, and suspended wells.

The municipal tax assessments on these facilities for the period from September 1982 to September 1983 amounted to approximately \$4.75 million dollars.

In addition to the municipal tax assessment on oil producers, tax assessments on pipeline companies were valued at approximately \$350,000.

Surface Owners

Companies wishing to explore or develop oil properties in Manitoba must negotiate a surface lease with the individual landowner. In return for this right-of-entry, the landowner normally receives a negotiated cash settlement which includes a first-year bonus payment and subsequent annual rental payments for the duration of the lease.

Where the landowner is renting his land to another party, the oil company seeking right-of-entry must obtain the consent of both the landowner and the occupant. After a lease has

been signed, the landowner and occupant then determine what each will receive as the respective share of the compensation paid by the oil company.

Following proclamation of The Surface Rights Act on August 9, 1983, disputes relating to right-of-entry are now referred to a Surface Rights Board which was appointed by the Minister of Energy and Mines on July 28, 1983. The Board's principal function is to arbitrate disputes between the petroleum industry and landowners regarding use of land for exploration, development and related operations and to determine what compensation should be paid to the landowner. The Board's office is located in Virden.

In 1983, an estimated $2.4 million was paid by oil companies to landowners in the form of first-year bonuses ($1.0 million) and annual rental fees ($1.4 million).

Oil Price Supplement Programs

New Oil Reference Price (NORP) Program:

The NORP program which became effective on January 1, 1982, continued during 1983 and as "New" oil production levels increased, the total value of NORP supplements also increased. This program was introduced and implemented in Manitoba as a result of oil pricing and taxation negotiations between the Governments of Manitoba and Canada in December 1981.

The NORP program works in the following manner: Operators producing "conventional new oil" sell their production at "Old" oil prices to purchasers and later receive a NORP supplement funded by the Government of Canada. The NORP supplement, together with the price for "Old" oil, makes the amount received for NORP production equal to the world oil price.

The Petroleum Branch administers the NORP program in Manitoba.

As of December 31, 1983, 292 wells were eligible for NORP supplements, an increase of 79% over the 163 wells eligible in December, 1982. In 1983 NORP supplements amounted to $17.9 million or 12% of the total value of provincial oil production. Compared with 1982, the value of NORP supplements increased by 54% in 1983.

Special Old Oil Price (SOOP) Program:

The SOOP program continued to operate until July 1983 at which time all wells qualifying for SOOP supplements became eligible to receive supplements equal in value to NORP supplements. This came about as the result of amendments to pricing agreements between the Federal Government and producing provinces, effective July 1, 1983.

As of December 31, 1983, production from 23 wells was eligible to receive the Special Old Oil Price. During 1983 a total of $245,800 was paid out in SOOP supplements.

Manitoba Drilling Incentive Program

The "Manitoba Drilling Incentive Program" provides for reduced Crown oil royalty and freehold oil tax rates on oil produced from new wells. Wells drilled between January 1, 1979 and January 1, 1987, and producing from Crown mineral rights may qualify for a special reduced royalty incentive rate which is 35% of the corresponding base royalty rate charged on "Old" oil. New wells producing from freehold mineral rights are eligible for a corresponding incentive tax rate under The Oil and Natural Gas Tax Act.

The reduced royalty and tax rates apply to production from a new oil well during its respective incentive period. The incentive period earned for wells producing from provincial Crown mineral rights is called the "royalty incentive period" (RIP) whereas wells producing from freehold mineral rights earn a "production incentive period" (PIP).

In 1983 approximately 30% of the 1 160 wells capable of producing oil in the Province were operating under an incentive period (11% under RIP and 89% under PIP). Seventy-six per cent of the 348 incentive wells in the province are located in the Waskada area.

It is estimated that since the program was implemented in 1979, the value of the incentive to industry has been in excess of $5.5 million.

Oil Reserves

From 1973 to 1980, remaining established oil reserves in Manitoba declined at a rate of approximately 5% per year due to production and lack of new discoveries.

This trend began to reverse in 1980 as new discoveries were made in the Kirkella area. New discoveries in the Waskada area in 1981 further arrested the decline and as a result of additional development in the area in 1982 and 1983 reserves increased. This increase in the Province's remaining established reserves followed more than 16 years of decline.

As of December 31, 1983, the province's total remaining established crude oil reserves were estimated to be 8.15 million m^3 (51 million barrels).

Oil and Natural Gas Conservation Board

The Oil and Natural Gas Conservation Board is established under provisions of The Mines Act with powers to inquire into all matters relating to the drilling, production, transportation, and distribution of oil and natural gas in Manitoba. The Board conducts hearings and may make orders as specified under The Mines Act.

In December 1983 the Board, on behalf of the Minister, heard presentations from four companies vying to build and operate a pipe line to transport crude oil from the Waskada area to the Interprovincial Pipe Lines' pumping station located at Cromer.

The Board also processed applications and issued the following Orders:

- Board Order No. 70 A pertaining to maximum permissible rate of production for wells in the Waskada Lower Amaranth Unit No. 1.
- Board Order No. F1-83 designating areas within the Province to be known as Fields.
- Board Order No. P1-83 designating and delineating underground reservoirs within the Province to be known as Pools.
- Board Order No. P2-83 (Amending Board Order No. P1-83) designating and delineating additional underground reservoirs within the Province to be known as Pools.
- Board Order No. PM 39 authorizing pressure maintenance by a pilot waterflood in the Waskada Lower Amaranth Unit No. 1.
- Board Order No. PM 40 authorizing pressure maintenance by water flooding for portions of the Waskada Lower Amaranth A Pool.
- Board Order No. 5SWD authorizing the disposal of produced salt water into the well Rideau Pipestone W. Kirkella 4-19-12-29 WPM.
- Board Order No. 6SWD authorizing the disposal of produced salt water into the well Mead Daly SWD R/E 5-26-9-29 WPM.
- Board Order No. 7SWD authorizing the disposal of produced salt water into the well Oakland Pierson SWD R/E 8-24-3-29 WPM.
- Board Order No. 8SWD authorizing the disposal of produced salt water into the well New Scope et al Waskada SWD 10-7-1-25 WPM.

Geological Services Branch

The Geological Services Branch has been restructured into four sections in order to provide improved program delivery, particularly under the current and pending federal/provincial mineral agreements. These are the Geological Survey Section, the Minerals Investigation Section, the Analytical Laboratory Section, and the Editorial and Cartographic Services Section.

The *Geological Survey* and *Minerals Investigation* sections undertake geological mapping, mineral deposit studies and other geoscientific investigations designed to provide an up-to-date geological framework and mineral data base for the province for use in mineral resource appraisal, land-use planning and in addressing environmental concerns.

The *Analytical Laboratory Section* provides the necessary analytical support for the Division's geological and mineral evaluation activities. The *Editorial and Cartographic Section* is responsible for the drafting and preparation of all maps, graphs, charts and illustrations for the Mineral Resources Division and the editing of all Branch publications and reports.

Geological Survey and Minerals Investigation

The annual Report of Field Activities and nine Preliminary Maps were released on November 16th at the Annual Meeting with Industry, which was attended by 194 delegates from industry, universities and other provincial and federal government agencies. Oral presentations by the staff of the Geological Services Branch were augmented by talks given by staff of the Geological Survey of Canada and University of Manitoba as well as an all day poster session highlighting the findings of the summer field program.

Planning was commenced for geoscientific activities to be conducted under a proposed five year Federal/Provincial Mineral Development Agreement (1984-89). By year end, both federal and provincial programs to be undertaken under this Agreement were well defined, with implementation planned for early in the new fiscal year.

The prinicpal focus of programs during the 1983 field season continued to be the Lynn Lake district where there is an urgent need to find new ore deposits that could sustain the existing mining community.

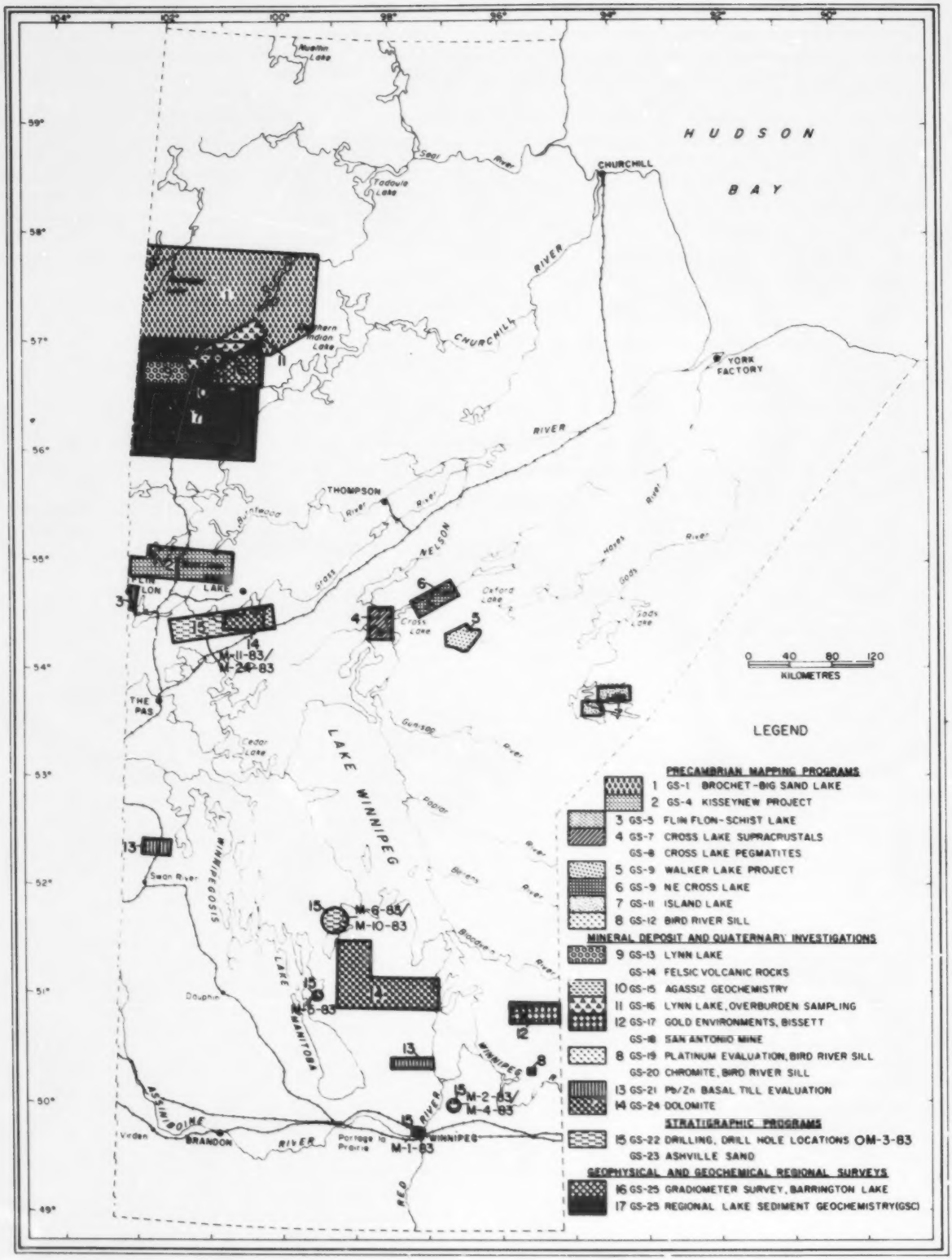
Activities conducted by the Branch (see Map 2) were substantially augmented by ground and airborne surveys mounted by the Geological Survey of Canada under the umbrella of the cost-shared Canada/Manitoba Interim Mineral Agreement (1983/85), signed June 17th, 1983.

Lynn Lake Area

Within the Lynn Lake region much of the initial groundwork in the greenstone terrain had been completed by the Province during the period 1976-82, as a result of which 1:50/000 scale geological maps are now available for the entire area south of latitude 57°. In 1983, geological mapping was completed in the Brochet-Big Sand Lake granitoid and gneissic terrain to the immediate north of Lynn Lake. No new sulphide occurrences were encountered and the overwhelming predominance of high grade gneisses and deep-seated granitic rocks is not encouraging from a mineral deposit perspective.

Mineral deposit studies in the greenstone belt focussed on geological settings deemed favourable for base and precious metal occurrences. Stratabound gold mineralization of probable exhalative origin at the Agassiz deposit is now known to occur within a sequence of sulphide-bearing rocks that include ultramafics, metasediments and oxide iron formation. This sequence has been traced from west of Agassiz to the north of Arbour Lake where similar mineralization has been recorded. Sporadic occurrences of gold mineralization have now been identified at this stratigraphic level over a strike length of 15 km, and this sequence is known from regional geological studies and geophysical signatures (INPUT, Gradiometer and total field magnetic surveys) to extend for a further 20 km east of Arbour Lake.

Geochemical studies in the Lynn Lake area included lithogeochemistry of rocks which are the host of selected base metal deposits, alteration studies around the Agassiz deposit, and biogeochemical studies over several other small gold deposits. Samples of spruce, labrador tea and humus material were collected at several localities in the Lynn Lake district and initial results showing gold, antimony and arsenic anomalies downslope (north) of the Agassiz mineralized zone, point to the potential usefulness of this technique in this sparsely exposed terrain. Samples collected from the Lynn Lake rhyolitic complex in 1982 were analyzed to ascertain whether geochemical alteration haloes exist around the known sulphide mineralization.



Map 2 Location of Field Projects

Till sampling initiated in 1982 was augmented by an additional 255 holes dug in the Agassiz-Minton Lake area in order to locate down-ice dispersion of heavy minerals from mineral deposits buried beneath the overburden. Quaternary stratigraphic investigations continued in the area, and biogeochemical sampling was augmented by 40 samples taken from frozen peat in the sphagnum bog south of the Agassiz mineralized zone.

The Geological Survey of Canada undertook regional lake sediment surveys for the Granville Lake area providing a sample density of one per 13 square km in the south and one per 7 square km in the north over the greenstone terrain. A portion of the water samples obtained during the survey were analyzed by the Manitoba Department of Environment as part of the evaluation of the impact of acid rain on lakes in the Province. The results of the sediment analyses were reported early in 1984 in the usual format of 1:250 000 element – abundance and ratio maps.

Airborne gradiometer surveys were extended east from the 1982 test site to encompass a 1 500 km area, including Barrington Lake. This completes the vertical gradient magnetic coverage for the entire east-trending segment of the greenstone belt from Lynn Lake to Longitude 100°. Ground Pulse Electromagnetic measurements were made at sites selected by the GSC in co-ordination with Sherritt Gordon Mines Limited.

Regional surficial mapping was also undertaken by the Geological Survey of Canada to provide background information for lake sediment surveys and to add a regional perspective to the basal till studies undertaken by the Province.

Geological mapping of the Churchill Province in Manitoba is now well advanced: however, an acute lack of baseline isotopic data has precluded confirmation of a Proterozoic/Hudsonian age for the supracrustal assemblages. To address this need, the Geological Services Branch and the Geological Survey of Canada have embarked upon a uranium-lead-zircon dating program which this year focussed on volcanic and intrusive units of the Lynn Lake and Flin Flon belts and the selection of samples amenable to zircon concentration.

Flin Flon Area

Detailed 1:20 000 scale geological mapping in the Flin Flon-Schist Lake area has defined the stratigraphic setting of the Flin Flon ore deposit, and established important new guidelines for future exploration in the area.

In the Lobstick Narrows area, detailed structural and stratigraphic investigations laid the foundation for more regional mapping on the south flank of the Kisseynew belt which will be of critical importance in the search for stratiform base metal, tungsten and gold mineralization in the area between Kisseynew and File Lakes.

Cross Lake Area

Geological mapping at Cross Lake was conducted in conjunction with the investigation of rare element pegmatites and the evaluation of vanadium, titanium and anorthosite occurrences. The mapping also succeeded in establishing a sound stratigraphic and structural framework for the area as a reference base for future work in this district. Regional mapping was completed in the Lawford and Walker Lakes area and resulted in the detailed documentation of barren greenstone occurrences on northeast Cross Lake and unique sapphirine mineral occurrences on Sipiwesk Lake.

The rare element pegmatite investigations at Cross Lake were conducted by the Department of Earth Sciences, University of Manitoba. These studies have established an intrusive history for the belt, confirmed the regional zonation of pegmatite minerals, and pointed to the eastern group of pegmatites as being the most fractionated and economically significant of the pegmatite field.

Northern Manitoba

On Island Lake, the mapping of the entire western half of the greenstone belt was completed. Mineralized zones encountered in siliceous metasediments are associated with felsic intrusives near Henderson Island.

Southeastern Manitoba

In southeastern Manitoba, gold deposit investigations were conducted in the Wallace Lake-Bissett district and included detailed geochemical sampling in the San Antonio Mine. Factors controlling the occurrence of gold-bearing quartz veins were reinterpreted and as a result important new guidelines for exploration were established.

The second phase of the platinum metal group evaluation of the Bird River Sill was concluded by cutting a 400 metre slice across the intrusion.

Evaluation of the chromite deposits in the Bird River Sill focussed on the "Chrome" and "Page" properties, and entailed a detailed stratigraphic analysis of the intrusion and sampling of all chrome-bearing units. Mapping indicated a 60 metre wide zone containing a total of 26 chromite-bearing layers which can be grouped into 6 zones, each with diagnostic characteristics that are consistent over strike lengths of more than 1.5 kilometres. Detailed analysis of individual chromites, chromitite seams and intervening host rock is continuing with the support of Dr. F. Hawthorne, Department of Earth Sciences, University of Manitoba, under contract from the Geological Survey and Canada.

Interlake

An evaluation of the lead-zinc potential of Paleozoic rocks in the Interlake area was continued with geochemical analysis of drill core and basal till sampling of selected profiles. More than one thousand samples of carbonate rock have now been analyzed for a wide range of elements.

Industrial minerals investigations entailed mapping of dolomite outcrops and quarries in the central Interlake and Wekusko-The Pas area and provided additional data on the vast resources of dolomite in the province. Drilling of high-calcium limestone at Dolly Bay, near Oakview, were inconclusive as to the extent of reserves in the area.

Drilling Program

The stratigraphic mapping and core hole program for 1983 involved a total of 24 core holes and five separate projects. A single hole was drilled in the City of Winnipeg area to aid in evaluating groundwater hydrogeology in the vicinity of an abandoned sanitary landfill site: the hole also provided data for the limestone and dolomite resource studies. Three holes were drilled in the Green Oak area to ground-truth a reflection seismic profile run by the Geological Survey of Canada in 1982 in the vicinity of an anomalous Precambrian high. A single drill hole in the Dolly Bay area of Lake Manitoba tested the Elm Point limestone beds to determine the quality of the high-calcium limestone deposits and to ascertain the structural control for distribution of limestone and dolomite beds in the area. Five holes were located in the Lake St. Martin area to aid in interpretation of the complex structure of this probable meteorite impact feature. Fourteen holes were drilled in the Simonhouse Lake-Wekusko Lake area to determine the nature of Precambrian basement rocks in this area of thin Paleozoic sedimentary cover, and specifically, to ground-truth a number of anomalies outlined by recent federal-provincial airborne gradiometer surveys. Ground magnetometer profiles were run to pinpoint drill targets. Phanerozoic core from these holes also provided data for the dolomite resources study and structural and stratigraphic Phanerozoic studies.

In the late fall of 1983, Branch personnel conducted a car-borne radiation survey of southeastern Manitoba to obtain measurements of background radiation from bedrock sources. Results of this survey were required by the Environmental Management Services Branch as part of their program to evaluate the sources and levels of radiation in ground waters from the Powerview/West Hawk area.

Petrological Laboratory

The mineralogical and rock preparation laboratories have been consolidated into the Petrological Laboratory and fall under the Geological Survey Section.

During the year ending March 31, 1984, the rock preparation laboratory completed 2 209 thin sections, 986 stained slabs, 117 polished slabs and 10 polished sections. In addition, 1 104 samples were prepared for chemical analysis.

The rock preparation laboratory also maintained two Petroleum Core Warehouses and received and provided support for 60 requests to view core by the petroleum industry.

Analytical Laboratory

During the year, the analytical and geochemistry laboratories carried out 14 834 silicate element determinations in support of Branch programs. In addition 23 772 geochemical determinations were carried out on silicate rocks, core samples and till samples; 4 642 assays for precious and base metals on samples submitted by Division geologists and prospectors; and sulphur and specific gravity determinations on crude oil samples submitted by the Petroleum Branch.

A new automated atomic absorption system was put into operation during the year.

Editorial and Cartographic Services

Editorial and Cartographic Services produced the figures and maps included in the publications listed in Table 9 and maps listed in Table 10. In addition, numerous maps, slides and other displays were prepared in support of departmental presentations such as the Annual Meeting with Industry, Careers Symposium and the Annual Convention of the Prospectors and Developers Association in Toronto.

STATISTICAL SUPPLEMENT
1983/84

TABLE 1

Comparison of Manitoba Mineral Production and Value 1982 and 1983

	1982 (Jan-Dec)			1983 (Jan-Dec)		
	Quantity (Imperial)	Value ($ 000)	Quantity (Metric)	Quantity (Imperial)	Value ($ 000)	Quantity (Metric)
Metals	(000 lb)		(000 kg)	(000 lb)		(000 kg)
Cadmium	83	114	37	224	311	102
Cobalt	667	10,296	303	708	5,805	321
Copper	107,608	95,243	48,810	148,071	140,325	67 164
Lead	1,610	530	730	1,146	307	520
Nickel	57,357	171,665	26,017	72,265	206,859	32 779
Selenium	67	315	31	99	456	45
Tantalum	131	7,243	59	—	—	—
Tellurium	10	148	5	8	119	4
Zinc	69,302	33,730	31,435	108,043	56,324	49 008
Precious Metals	(000 tr oz)		(000 g)	(000 tr oz)		(000 g)
Gold	56	25,852	1,729	71	36,739	2 194
Platinum Group				31	8,880	965
Silver	815	8,014	25,355	1,056	14,952	32 858
Total Metals		353,150			471,077	
Industrial Minerals	(000 ton)		(000 tonne)	(000 ton)		(000 tonne)
Clay Products	—	6,223	—	—	7,350	—
Cement	360	34,666	327	156	14,260	141
Gypsum	120	2,006	109	210	2,231	190
Lime	—	4,196	—	—	4,229	—
Peat Moss	48	7,840	44	60	7,266	54
Quartz	160	1,952	145	225	2,312	204
Sand/Gravel	11,337	28,054	10,284	10,923	26,537	9 909
Stone	2,585	11,670	2,345	1,253	5,452	1 137
Total Industrial Minerals		96,607			69,637	
Fuels	(000 bbl)		(000 m^3)	(000 bbl)		(000 m^3)
Petroleum	3,664	101,065	582	4,638	152,892	737
Grand Total		550,822			693,606	

Source: Manitoba Energy and Mines

TABLE 2

A Comparison of Value of Manitoba Metals, Industrial Minerals, Fuels and Total Mineral Production From 1973 - 1983 (Calendar Year) ($000)

Year	Metals	Industrial Minerals	Fuels	Total
1973	363,650	38,416	17,148	419,214
1974	413,530	45,556	27,169	486,255
1975	452,236	50,662	31,451	534,349
1976	412,301	69,173	33,557	515,031
1977	446,691	81,597	40,428	568,716
1978	338,123	83,696	45,937	467,756
1979	510,049	94,279	48,403	652,731
1980	664,809	100,814	54,968	820,591
1981	478,636	115,189	64,251	658,076
1982	353,150	96,607	101,065	550,822
1983	471,077	69,637	152,892	693,606

TABLE 3

Mineral Dispositions in Good Standing at Calendar Year End 1980 to 1983

	1980		1981			1982			1983		
Mining	No.	Acres	No.	Acres	Hectares	No.	Acres	Hectares	No.	Acres	Hectares
Mining Claims	2,996	125,020	6,875	1,835,039	742 614	6,308	1,705,997	690 392	5,783	1,598,651	646 951
Claim Blocks*	3,551	1,479,657	—	—	—	—	—	—	—	—	—
Order in Council Leases	4,184	295,000	4,184	295,000	119 382	4,184	295,000	119 382	4,184	295,000	119 382
Permits	14	956,282	13	723,570	292 818	8	694,463	281 039	6	477,624	193 288
Explored Area Leases	39	34,409	38	35,513	14 372	38	35,513	14 372	38	35,513	14 372
Production Leases	27	29,993	29	31,336	12 681	28	31,296	12 665	27	31,256	12 649
Miscellaneous Mineral Leases	1	996	1	996	403	1	996	403	1	996	403
Potash											
Permits	1	43,390	1	43,390	17 559	1	33,310	13 480	1	33,310	13 480
Quarrying											
Leases	275	22,717	302	23,670	9 579	366	26,178	10 594	368	26,199	10 602
Exploration Permits	10	2,305	13	2,336	945	9	2,014	815	9	2,014	815
Peat											
Leases	14	6,468	13	6,466	2 617	18	8,225	3 329	18	7,505	3 037
Exploration Permits	—	—	8	4,347	1 759	9	3,087	1 249	4	1,560	631
TOTAL	11,112	2,996,237	11,477	3,001,663	1 214 729	10,970	2,836,079	1 147 720	10,439	2,509,628	1 015,610

* *Manitoba Regulation 147/81, which came into effect July 11, 1981, discontinued the use of the term "claim blocks"*

TABLE 4

Mineral Dispositions Issued Each Calendar Year 1980 to 1983

	1980		1981			1982			1983		
Mining	No.	Acres	No.	Acres	Hectares	No.	Acres	Hectares	No.	Acres	Hectares
Mining Claims	134	5,131	1,318	553,133	223 845	643	285,908	115 703	891	427,628	173 055
Claim Blocks*	1,114	493,971	–	–	–	–	–	–	–	–	–
Permits	8	742,767	3	231,944	93 864	5	491,347	198 841	3	308,701	124 927
Explored Area Leases	1	208	1	1,872	758	–	–	–	–	–	–
Production Leases	5	280	3	1,383	560	–	–	–	–	–	–
Miscellaneous Mineral Leases	1	996	–	–	–	–	–	–	–	–	–
Potash											
Permits	1	43,390	–	–	–	–	–	–	–	–	–
Quarrying											
Leases	48	3,327	39	1,900	769	76	5,045	2 042	17	739	299
Exploration Permits	7	1,895	5	439	178	1	1,947	788	–	–	–
Casual Permits	96	–	77	–	–	78	–	–	74	–	–
Permissions to Remove	381	–	416	–	–	528	–	–	569	–	–
Peat											
Leases	–	–	–	–	–	5	1,759	712	3	242	98
Exploration Permits	–	–	8	4,347	1 759	3	1,307	529	–	–	–

** Manitoba Regulation 147/81, which came into effect July 11, 1981, discontinued the use of the term "claim blocks"*

TABLE 5
Revenue from Mining and Quarrying
(to March 31st)

	1982/83	1983/84
Disposition and Fees, Rental, etc.	$368,287	$1,724,526*
Mining Claim Lease Tax	76,616	76,543
Royalties (from industrial mineral production)	463,066	373,230
The Mining Royalty and Tax Act**	544	10,012,420
The Mining Tax Act***	224,000	23,642,233
TOTAL	$1,132,513	$35,829,233

* *Includes rental arrears in the amount of $1,217,517.00 for mining claim leases grouped under O.I.C. 1746/56.*

** *Collection of a royalty under The Mining and Royalty and Tax Act was discontinued after December 31, 1980. The revenue shown represents re-assessments for the period prior to that date.*

*** *The Metallic Minerals Royalty Act was redesignated The Mining Tax Act effective January 1, 1981. Revenue shown includes re-assessments made under the former Act.*

TABLE 6
Manitoba Petroleum Statistics
(1974 - 1983)
(Calendar Year)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Geophysical Licenses Issued	–	1	3	2	5	10	9	11	19	14
Expenditures ($)	–	106,500	118,308	1,046,220	3,451,370	2,970,734	1,843,438	2,116,854	1,805,512	3,639,692
Drilling Licenses Issued	22	9	16	21	16	27	27	71	201	284
New Wells Drilled	22	11	16	13	22	25	27	62	195	247
New Oil Producers	7	2	3	7	10	11	18	38	145	184
New Wells Abandoned	14	8	10	2	6	9	9	15	30	24
Metres Drilled	23 784	8 805	13 515	11 584	18 329	20 537	23 508	61 011	184 291	229 304
Wells Capable of Production (Dec.)	871	831	821	804	808	811	823	853	1,002	1,160
Wells Producing (December)	714	686	688	701	703	705	720	748	896	1,041
Previous Producers Abandoned	30	12	24	7	3	4	5	5	11	13
Other Wells Abandoned	3	1	3	1	2	1	0	3	8	5
Crude Oil Production (m^3)	754 667	701 459	633 322	630 466	598 354	583 377	563 482	542 695	582 283	737 052
Water Production (m^3)	3 994 539	3 977 222	4 021 932	4 228 083	4 075 178	3 946 337	4 171 051	4 565 210	4 581 786	5 079 609
Total Fluid Production (m^3)	4 749 206	4 678 681	4 655 254	4 858 549	4 673 532	4 529 714	4 734 533	5 107 705	5 163 997	5 816 661
% Water Cut	84	85	86	87	87	87	83	89	89	87
Average Oil Production (m^3 per day)	2 068	1 922	1 730	1 727	1 639	1 598	1 540	1 487	1 595	2 019
Total Oil Sales ($)	27,181,792	31,452,592	33,532,609	40,457,038	45,953,383	48,403,312	54,948,288	64,054,832	100,537,270	152,934,463
Crown Oil Royalty ($ received)	1,598,907	1,823,361	2,023,828	2,263,015	2,281,355	2,280,162	2,574,515	2,714,733	3,175,625	4,135,497
Freehold Mineral Tax ($ received)	5,216,314	6,498,072	6,128,261	7,012,188	8,017,968	8,768,511	9,159,426	10,005,107	12,194,350	14,825,318
Total Crown Revenue ($ received)	6,815,221	8,321,433	8,152,089	9,275,203	10,299,323	11,048,673	11,733,941	12,719,840	15,369,975	18,960,815
Average Well Head Price per m^3 ($)	35.99	44.86	52.79	64.12	76.77	82.96	97.52	118.39	173.57	207.49
Reservation Sale Bonuses ($)	–		(last sale held in 1969)	–	–	40,888	820,345	611,199	–	40,192
Lease Sale Bonuses ($)	–		(last sale held in 1971)	–	–	897,895	1,057,530	1,074,958	1,055,700	1,032,267
Reservation and Lease Rentals & Fees ($)	15,009	11,700	10,766	10,237	10,198	49,303	133,635	191,409	235,812	274,088
Crown Reservation Area (ha)	–	–	–	–	–	4 736	16 915	22 291	20 947	14 496
Crown Lease Area (ha)	8 108	7 213	6 954	6 759	6 759	22 559	29 519	40 806	45 752	57 462
Total Crown Area Under Disposition (ha)	8 108	7 213	6 954	6 759	6 759	27 295	46 434	63 097	66 699	71 958
Industry Reported Total Expenditures ($)	12,500,000	13,900,000	14,600,000	18,900,000	27 900,000	31,000,000	38,300,000	55,200,000	82,600,000	116,500,000

Certain Petroleum Industry Reported Figures are Estimates

TABLE 7
Summary of Crude Oil and Salt Water Production — All Fields

	Oil				Water		
	Cum. Prod. to Dec. 31/82 m^3	1983 Prod. m^3	Cum. Prod. to Dec. 31/83 m^3	Wells Producing Dec. 1983	Cum. Prod. to Dec. 31/82 m^3	1983 Prod. m^3	Cum Prod. to Dec. 31/83 m^3
Daly Field	3 497 241.4	67 254.4	3 564 495.8	133	14 088 752.1	705 082.4	14 793 834.5
Tilston Field	73 097.2	4 339.0	77 436.2	9	481 608.3	5 595.8	487 204.1
Waskada Field	217 927.0	239 736.5	457 663.5	241	128 438.0	272 422.1	400 860.1
Lulu Lake Field	33 723.3	1 833.3	35 556.6	5	148 359.6	9 653.1	158 012.7
Virden Field	17 165 185.8	375 506.7	17 540 692.5	539	59 556 042.5	3 792 460.0	63 348 502.5
Whitewater Field	74 214.9	5 881.0	80 095.9	12	30 655.1	16 416.1	47 071.2
Pierson Field	252 401.8	10 716.6	263 118.4	27	489 737.4	37 533.9	527 271.3
West Butler Field	29 412.7	498.6	29 911.3	2	6 521.0	—	6 521.0
Kirkella Field	178 032.0	16 181.8	194 213.8	35	1 199 848.8	165 597.1	1 365 445.9
Souris Hartney Field	122 316.5	2 693.5	125 010.0	6	207 864.9	13 227.0	221 091.9
Coulter Area	4 517.1	1 576.7	6 093.8	6	26 796.0	10 716.9	37 512.9
Other Areas	26 332.1	10 834.2	37 166.3	26	148 537.0	50 904.4	199 441.4
Provincial Total	21 674 401.8	737 052.3	22 411 454.1	1 041	76 513 160.7	5 079 608.8	81 592 769.5

TABLE 8

Crude Oil Sales; Transporters' Dispositions; Transporters' Deliveries 1983

Producers Disposition

Field	Production	Opening Inventory	Adjustments	Closing Inventory	Sales (m^3)	Value of Sales*
Daly	67 254.4	885.3	$ 18.3	1 122.0	67 036.0	$ 12,340,611
Tilston	4 339.0	184.1		44.8	4 478.3	811,930
Waskada	239 761.8	3 210.8	$2 330.7	3 306.3	241 997.0	43,926,590
Lulu Lake	1 833.3	184.0		53.3	1 964.0	350,998
Virden	375 506.7	2 764.1	- 58.0	3 246.4	374 966.4	69,170,733
Whitewater	5 881.0	93.0	-2 741.0	178.0	3 055.0	542,252
Pierson	10 716.6	466.4	- 11.0	373.2	10 798.8	1,970,069
West Butler	498.6	42.8		30.0	511.4	92,614
Kirkella	16 181.8	403.5		416.4	16 168.9	2,77,157
Souris Hartney	2 693.5	70.8		93.2	2 671.1	470,210
Coulter Area	491.6	152.6	$132.6	193.0	583.8	106,133
Other Areas	11 894.0	279.2	$1 928.8	1 074.6	13 027.4	2,346,516
Total	737 052.3	8 736.6	$1 600.4	10 131.2	737 258.1	$134,905,813

Transporters' Disposition

Opening Inventory (m^3)	
Norcen Pipeline Ltd.	2 376.3
Interprovincial Pipelnies Ltd.	12 561.9

Deliveries to Transporters (m^3) at Cromer, Manitoba

Manitoba Production	735 533.7
Saskatchewan Production	52 227.8
	802 699.7

Transporters' Deliveries (m^3) to

Province	Location	Refinery	
Manitoba:	Gretna	Shell	81 887.6
	Winnipeg	Shell	–
Ontario:	Bronte	BP	–
	Corunna	Shell	110 058.6
	Sarnia	Imperial	143 635.7
	Nanticoke	Texaco	3 671.4
Quebec:	Montreal	Imperial	30 984.9
	Montreal	Petrofina	6 813.1
	Montreal	Shell	131 195.4
	Montreal	Sunoco	209 760.1
	Montreal	Texaco	3 303.0
USA:			
Illinois	Mokena	Union	1 345.7
Michigan	Marysville	Sunoco	11 691.5
Minnesota	Clearbrook	Koch	58 506.9
Closing Inventory (m^3):			
Norcen Pipelines Ltd.			2 405.5
Interprovincial Pipelines Ltd.			7 833.3
Adjustment			(393.0)
			802 699.7

** Does not include supplements paid under NORP and SOOP programs.*

TABLE 9

List of Publications and Presentations — 1983

Mineral Resources Division

Publications

Geological Report GR77-1 (GSC Memoir 392)	Devonian rocks of the Lake Winnipegosis-Lake Manitoba Outcrop Belt, Manitoba; 280 pages, 111 figures, 15 tables, 45 photos - by A.W. Norris, T.T. Uyeno and H.R. McCabe
Open File Report OF83-3	Devonian potash deposits in Manitoba; 27 pages, 11 figures, 5 tables - by B.B. Bannatyne
Geological Report GR82-2	Systematics and paleoecology of Upper Ordovician Trilobites from the Selkirk Member of the Red River Formation, Southern Manitoba, 51 pages, 4 figures, 10 plates, 2 tables. - by S.R. Westrop and R. Ludvigsen
Geological Report GR82-4	Quaternary Geology and Aggregate Resource Inventory of The Thompson Area. - by R. V. Young
Geological Report GR82-5	Aggregate Resource Inventory of the Churchill Area. - by R. V. Young.
Open File Report OF83-1	Aggregate Resource Inventory of South Riding Mountain Area. - by R. V. Young.
Open File Report OF82-5	Aggregate Resource Inventory of the Rural Municipality of Brokenhead. - by R. V. Young.
Open File Report OF83-2	Surficial Geology and Aggregate Resources Inventory of the Russell-Shoal Lake Area. - by Gartner Lee Associates.
Lunar and Planetary Institute Report 83-03:95-97	The Pikwitonei granulite domain: A lower crustal level along the Churchill-Superior Boundary in Central Manitoba - by W. Weber.
Ontario Geological Survey Misc. Paper 114:122-127	Silica resources in Manitoba - by D.M. Watson.
Geological Society of America Memoir 161:191-207	Proterozoic exhalative massive sulphide deposits. - by G.H. Gale.
CIM Bulletin 76:851	Geology and geochemical alteration at the Agasssiz Au-Ag deposit, Lynn Lake, Manitoba; (Abstract), p. 81. - by M.A.F. Fedikow and C. Taylor.

Oral Presentations

April 1983 — CIM Annual Meeting, Winnipeg

Fedikow, M.A.F. and Taylor, C.*	Geological setting and geochemical alteration at the Agassiz Gold-Silver Deposit, Lynn Lake, Manitoba.
Watson, D.M.	Industrial minerals in Manitoba.
Bannatyne, B.B.	Devonian potash deposits in Manitoba.
Theyer, P.	Gold mineralization in the Island Lake area, Manitoba.
Young, R. V.	Aggregate Mineral Land Use Policies.

May, 1983 — GAC-MAC Annual Meeting, Victoria, B.C.

Gilbert, H.P., Weber, W., Neale, K.*	The stratigraphy and structure of part of the Island Lake greenstone belt, Manitoba.
Green, A.*, Hajnal, Z.*, Weber, W.	A new plate tectonic model of the Superior-Churchill boundary.

June, 1983 — Nineteenth Forum on the Geology of Industrial Minerals, Toronto

Watson, D.M.	Silica resources in Manitoba.

June, 1983 — Municipal Council of Woodlands, Woodlands

Jones, C. W.	Aggregate Resources in the Rural Municipality of Woodlands.

August, 1983 — 1983 Archean Geochemistry: Early Crustal Genesis Field Workshop, Ottawa, Ontario

Weber, W.	The Pikwitonei granulite domain: A lower crustal level along the Churchill-Superior boundary in central Mantoba.

November 8-12, 1983 — Presentation to Appalachian State University, Boone, North Carolina and University of North Carolina - Chapel Hill

Watson, D.	Bird River Sill and Industrial Minerals in Manitoba.

November, 1983 — Manitoba Mineral Resources Division, Geological Services Branch, Annual Meeting with Industry 1983, Winnipeg

Syme, E.C.	New developments in Flin Flon geology.
Watson, D.M.	Chromite evaluation — Bird River Sill.
Theyer, P.	Geology of gold environments in the Bissett/Wallace Lake portion of the Rice Lake greenstone belt, Manitoba.
Fedikow, M.A.F.	The geochemical signature of the Agassiz Au-Ag deposit, Lynn Lake, Manitoba.

January, 1984 — Eastern Interlake Planning District, Gimli

Jones, C. W.	Aggregate Resources in the Eastern Interlake Planning District.

February 2, 1984 — Precambrian High, Ottawa, Ontario

Syme, E.C.	Stratigraphic framework and geochemical evolution of the Lynn Lake greenstone belt.

March 8, 1984 — Prospectors and Developers Association Presentation, Toronto, Ontario

Gale, G.H.	Stratabound gold mineralization in Manitoba.

March 23, 1984 — Precambrian High, Ottawa, Ontario

Zwanzig, H.V.	Tectonic evolution of the Churchill River magmatic zone.

**External co-authors*

TABLE 10
List of Preliminary Maps — 1983
Precambrian Geology

		Scale
1983M-1	Brochet-Big Sand Lake (64F and 64G west half) by D.C.P. Schledewitz	1:250 000
1983W-1	Flin Flon-Schist Lake (parts of 63K/12, 13) by A.H. Bailes and E.C. Syme	1:20 000
1983K-1	Lobstick Narrows (parts of 63K/13, 14 and 63N/3,4) by Herman V. Zwanzig	1:20 000
1983N-1	Lawford Lake area (parts of 63 I/7, 9, 10) by K.C. Albino and J.J. Macek	1:50 000
1983N-2	Cross Lake northeast (parts of 63 I/14, 15) by K.C. Albino, N. Barr, A. Grossjean and J.J. Macek	1:50 000
1983N-3	Southeast Cross Lake-West Pipestone Lake by M.T. Corkery and P.G. Lenton	1:20 000
1983I-1	Island Lake (53E/15SE and parts of 53E/16SW) by H.P. Gilbert, K.L. Neale, W. Weber, M.T. Corkery and C.R. McGregor	1:20 000
1983I-2	McGowan Lake (53E/16NE) by W. Weber	1:20 000
1983I-3	Krolman Lake (53E/16NW) by W. Weber	1:20 000

Surficial Geology

1983WM	Surficial Geology and Aggregate Resource Inventory of the Rural Municipality of Whitemouth (parts of 52E/13, 62H/16, 52L/4 and 62 I/1) by R.V. Young	1:50 000
1983SD-1	Sand and Gravel Resources of the Selkirk and District Planning Area, North portion (parts of 62 I/6, 7) by Phyllis Mitchell	1:50 000
1983SD-2	Sand and Gravel Resources of the Selkirk and District Planning Area, South portion (parts of 62 I/2, 3) by Phyllis Mitchell	1:50 000

TABLE 11

Energy and Mines Expenditure Summary
Year Ended March 31, 1984

Service	1983/1984 ($000's) Actual	Estimate	Variance increase/ (decrease)	Explanation Number
Administration				
Executive Management	280.4	291.2	(10.8)	
Administrative Services	352.6	394.1	(41.5)	
Manitoba Energy Council	27.8	10.0	17.8	1
Manitoba Energy Authority	257.0	250.0	7.0	
Surface Rights Board	91.7	80.0	11.7	
TOTAL	1,009.5	1,025.3	(15.8)	
Energy				
Energy Economics	554.9	606.7	(51.8)	
Administration and Energy Programs	583.4	1,150.9	(567.5)	2
Canada-Manitoba Energy Agreement	2,675.0	4,678.4	(2,003.4)	3
Canada-Manitoba National Energy Audit Program	403.3	917.8	(514.5)	4
Cut Home Energy Costs Program (CHEC)*	342.3	0.0	342.3	5
TOTAL	4,558.9	7,353.8	(2,794.9)	
Jobs in Energy Conservation **				
Mineral Resources				
Mineral Resources Administration	**218.7**	**222.6**	**(3.9)**	
Petroleum	**606.5**	**616.0**	**(9.5)**	
Mines	**2,062.1**	**2,118.5**	**(26.4)**	
Geological Services	**2,281.6**	**2,346.6**	**(65.0)**	
TOTAL	**5,196.9**	**5,303.7**	**(104.8)**	
Expenditures Related to Capital Assets				
Manitoba Mineral Resources Ltd.	170.0	1,345.3	(1,175.3)	6
TOTAL DEPARTMENT	10,937.3	15,028.1	(4,090.8)	

* *CHEC loans totalling $3,786,000 were funded by Manitoba Jobs Fund.*
** *Total of $655,963 was funded by the Manitoba Jobs Fund.*

Explanation of Major Variances

1. Manitoba Energy Council re-activated 1983/84
2. Major reduction due to Manitoba Hydro assuming the financing of High Voltage Direct Current research centre ($489.7); also lower management costs shareable under CREDA and fewer requests for grants
3. Reduction is a result of delays in completion of capital projects due to lengthy approval process (consultation with community and municipal groups, pre construction engineering consultation, tendering of contracts, monitoring, etc.)
4. Reduction due mainly to lower number of consultant Advice Assistance Program grants being disbursed in the fiscal year ($40.1) of $362.8 committed, out of $489.0 authorized for CAAP grants
5. Direct program expenditures for administration/co-ordination of the CHEC Loan Program were previously paid by the Department of Finance. Funding by the Jobs Fund for CHEC loans requires Energy and Mines to absorb administrative expenses
6. Manitoba Mineral Resources Ltd. was refinanced from Loan Authority on an equity basis during 1983/84. Balance of funding was allowed to lapse.